Table of Contents

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FINAL REPORT

THE EFFECT OF FOOD STAMPS ON THE LABOR SUPPLY OF UNMARRIED ADULTS WITHOUT DEPENDENT CHILDREN

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CONTENTS

Table of Contents

TABLES

Table of Contents

EXECUTIVE SUMMARY

This report presents findings from an econometric study of the effects of the Food Stamp Program (FSP) on the work effort of low-wage, unmarried men and women without dependent children. A model of the joint determination of the wage rate and hours of work is estimated separately for men and women using data from the 1984 Panel of the Survey of Income and Program Participation (SIPP). Estimates of the model are used to derive the wage and income elasticities of labor supply and to simulate the effects of the current FSP, as well as hypothetical changes in the FSP on work effort. The elasticities and simulation results are compared with our previous findings for female heads of household with dependent children.

THE MODEL

The empirical model of hours and wages is based on the microeconomic theory of utility (satisfaction) maximization in the presence of a budget constraint. In this application of the theory, an individual is assumed to weigh the tradeoff between leisure and income and then to choose the optimal hours of work per week. The model consists of two equations:

1. A labor supply equation in which weekly hours of market labor are specified to be functions of the net wage rate, nonlabor income, and characteristics of the individuals.

2. A wage equation in which the gross wage rate is specified to be a function of personal characteristics as well as hours of work. The disturbance term in this equation is permitted to be correlated with the disturbance term in the labor supply equation.

The dependence of the wage rate on hours of work, as well as the possible correlation of the disturbance terms in the two equations, require that simultaneous equations techniques be used to estimate this model.

Absent from the model is an equation explaining the decision to participate in the FSP. We believe that the food stamp participation decision is actually made jointly with the decision regarding the level of work effort; however, SIPP provides too few observations on single men and women without dependents who participate in food stamps to support the estimation of an FSP participation equation. Therefore, it was necessary to drop this equation from our empirical model.

DATA

We estimated the model of wages and hours on data for 632 men and 660 women from the 1984 SIPP Panel. We obtained most of the data from Wave-4 of the survey, which were collected in the fall of 1984, but augmented this with work history data from Wave 3. Our analysis files provide data on unmarried men and women ages 18 through 59 with no dependent children under the age of 18. Men and women with high wages or substantial financial assets are excluded from the files, as are those who reside in households with aged or disabled persons.

Especially notable is the absence of food stamp recipients from our analysis files for men and women. We found only 74 SIPP respondents who satisfied the criteria for inclusion in our analysis files and who also received food stamps. Our effort to use the data on these cases to estimate a food stamp participation equation jointly with the labor supply and wage equations was unsuccessful due to the small number of cases. It was therefore necessary to forgo the incorporation of food stamps into the estimation phase of our analysis. Accordingly, we removed the 74 food stamp recipients from our final analysis files.

ESTIMATION RESULTS

We used a maximum likelihood procedure to jointly estimate the wage rate and hours of work equations separately for men and women. By transforming the estimates of two critical parameters in the hours equation, we obtained estimates of the wage and income elasticities of labor supply that are comparable with existing estimates for other demographic groups. We estimate that the wage elasticity of labor supply is .99 for single men and 1.14 for single women. Our estimates of the income elasticity are -.27 and -.17, respectively, for single men and women.[1] All four of the parameter estimates that underlie these estimated elasticities are different from zero at the .01 level of significance.

The estimated wage elasticities for single men and women are much larger than our previous estimates for female heads of household (those estimates range from .26 to .35) and are also much larger than existing estimates for married men (roughly .08 to .20). They are only slightly larger than existing wage elasticity estimates for married women (roughly .80 to 1.00). The large wage elasticities for single men and women indicate that their work effort is highly responsive to changes in the net wage rate. If their responses to food stamps are roughly equivalent to their responses to cash income, then these elasticity estimates suggest that food stamp regulations which alter the effective net wage rate, such as the food stamp benefit reduction rate, may have important impacts on work effort.

The estimated income elasticities of hours of work by single men and women are somewhat larger than our previous estimates for female heads and are also somewhat larger than existing estimates for married men and women; however, the absolute differences are not so great as for the wage elasticities.

SIMULATION RESULTS

On the assumption that the labor supply response to food stamps is equivalent to the response to cash income, we used estimates of the parameters in the wage and hours

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[1]A wage (or income) elasticity of, say, .85, indicates that a 100 percent change in the wage rate (or in nonlabor income) causes an 85 percent increase in hours of work.

Table of Contents

equations to simulate the labor supply effects of three hypothetical changes in current Food Stamp Program regulations:

1. An increase in the benefit reduction rate (BRR) from .30 to .33

2. The replacement of the uncapped 20 percent earned-income deduction with a 100 percent deduction up to a maximum of $75 per month

3. The elimination of the $10 minimum benefit for one- and two-person households

We compared the simulated weekly hours of work by food stamp participants after each hypothetical change with the simulated work effort under current food stamp regulations. From 8.18 hours of work per week under current regulations, we found that the average simulated hours of work per week by men falls by 2.4, 3.8, and 8.6 percent, respectively, in response to changes 1 through 3.[2] These reductions are small, but the program changes are also small. The simultaneous implementation of all three changes constitutes a more substantial change and it is simulated to result in a 22.6 percent reduction in the average hours of work by food stamp participants. Our simulation results for single women are very similar to these for single men.

In interpreting the simulation results it is important to note that we are comparing the average work effort of FSP participants after a program change with the average work effort of program participants prior to the change. The base upon which the average work hours are computed is not constant. This means that some of the reduction in average work effort is due to exit from the program by participants who had been working more than the average number of hours. The remainder of the reduction is due to actual reductions in work effort by persons who remain on the program following the change in regulations. Our simulation methodology does not permit the separate estimation of these two effects.

While all three of the hypothetical program changes are simulated to result in reductions in the average work effort of single men and women who are food stamp recipients, they appear to have little effect on the average work effort of all low-wage single men and women without children under age 18.[3] This is because some persons who work and receive small amounts of food stamps under the current program simply stop participating and make little adjustment in their work effort in response to the hypothetical changes, while others exit the program and increase their work effort. The

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[2]For female heads with dependent children, we previously obtained simulated reductions of 1, 2, and 3 percent in response to the same three hypothetical program changes.

[3]One should not conclude from this that the full population of low-wage single men and women without dependent children is unresponsive on average to all changes in the FSP. Our simulations indicate that this group would increase its average weekly hours of work by about 6 percent in response to the complete elimination of the Food Stamp Program.

Table of Contents

former response causes the average work effort of food stamp participants to fall but does not affect the average work effort of all low-wage persons, while the latter response offsets work effort reductions by persons who remain on food stamps following the hypothetical changes.

In conclusion, our simulation results show that small changes in regulations governing food stamp eligibility and benefits may result in small changes in the average hours of work by unmarried men and women who are food stamp participants. While small, these labor supply responses are larger than those which we previously simulated for female heads of household. It is likely that more dramatic changes in FSP regulations (e.g., changes comparable to the elimination of the AFDC Program's "thirty and one-third" earned income deduction by the Omnibus Budget Reconciliation Act of 1981) would have a substantial impact on the work effort of single men and women.

Table of Contents

A. INTRODUCTION

This report presents econometric estimates of the wage and income elasticities of the labor supply of unmarried men and women without dependent children. It also presents findings from simulation exercises in which we use our estimates of the responsiveness of work effort to income opportunities to predict the effects of the current Food Stamp Program (FSP) and changes in the program on the labor supply of single men and women.

This research is based upon a modified version of a model of wages, participation in assistance programs, and labor supply that we previously used to analyze the effects of food stamps on the work effort of female heads of household (Fraker and Moffitt, 1985 and 1988). We use data from the 1984 Panel of the Survey of Income and Program Participation (SIPP) to estimate the modified model and to conduct the simulations of food stamp effects on labor supply. Not surprisingly, we find that the wage and income elasticities of labor supply and the simulated work-effort responses to the FSP are larger for single men and women than for female heads.

The report consists of four substantive sections. Section B develops the model that is the basis for our econometric estimation as well as our simulation exercises. Section C describes the SIPP data on the unmarried men and women who are the subjects of this study. Separately for men and women, Section D presents estimates of the model, derives the implied elasticity estimates, and compares the elasticity estimates with existing estimates for other demographic groups. Section E reports findings from simulation exercises in which we use the model estimates to predict the effects of the FSP on the work effort of unmarried men and women without dependent children.

B. A MODEL OF LABOR HOURS AND WAGES

The model that we estimate in order to determine the effects of the FSP on the work effort of single men and women without dependent children is a variant of a model

Table of Contents

that we estimated previously (Fraker and Moffitt, 1985 and 1988). That model, which we shall denote the FM model, was designed to be estimated on a sample of female heads of household and incorporates both AFDC and food stamps. It provides a specification of the effects of AFDC and food stamps on the labor supply of female heads as well as on the probabilities of their participation in the two assistance programs.

Our major modifications to the FM model are to delete the specification of the determinants of program participation and to focus the estimation of the model on nonrecipients. The AFDC program must be ignored in our analysis because we examine

program. Further, since only 5 percent of our sample participates in the FSP--74 individuals in absolute terms, including both men and women--we must also ignore the FSP for sample size reasons. We therefore estimate our model on the nonrecipient sample, conducting separate analyses for men and women. We subsequently use the

Table of Contents

1. Structure of the Model

Our model shares a central feature with the FM model, which is its focus on the decision of whether to work full-time, part-time, or not at all. We estimate how the net income amounts available under these alternatives affect the probability that an individual chooses each one. The net income available at the three work alternatives is given by the following simple budget constraint:

$$Y_i = W_i H_i + N + C_i - T_i \tag{1}$$

where Y_i is net income for work alternative i (i=0 if the individual does not work, i=1 if he or she works part-time, and i=2 if he or she works full-time), W_i is the wage rate available at the three alternatives, H_i is hours worked per week at the three alternatives, N is household income that is not attributable to the labor of the individual in question, C_i is the amount of unemployment compensation available at the three alternatives (C_i and C_i are assumed to equal zero), and T_i is the individual's tax obligation at the three hours or work points.

Let U_i be the "utility" of work alternative i. This utility should be thought of as capturing not only the monetary attractiveness of each of the three alternatives but also the convenience or inconvenience of working different amounts. We assume that the utility function is quadratic in hours and income:

$$U_i = \alpha H_i - \beta H_i^2 + \phi Y_i - \delta Y_i^2 \tag{2}$$

The quadratic utility function has been used extensively in empirical studies of individual and household behavior (see Goldberger, 1967, for a discussion of the function). In addition to being simple and convenient to use, this function has the desirable property of being concave when hours of leisure and income are below the amounts at which the

Table of Contents

function peaks.[2] One of its four parameters must be normalized, so we set $\phi=1$ (equivalent to dividing through by ϕ).

We assume that an individual selects the hours-of-work alternative that provides the highest utility. The choice of work effort can be written as follows:

$$H = \begin{cases} 0 & \text{if } U_0 > U_1 \text{ and } U_0 > U_2 \\ PT & \text{if } U_1 > U_0 \text{ and } U_1 > U_2 \\ FT & \text{if } U_2 > U_0 \text{ and } U_2 > U_1 \end{cases} \qquad (3)$$

where H is hours of work per week, PT signifies part-time work, and FT signifies full-time work.

Of the three unknown parameters in the utility function, β and δ are the most important because, as shown below in equations (7) and (8), they determine the values of the wage and income elasticities of hours of work. We expect β to be positive. The negative sign preceeding this parameter in the utility function means that the disutility of each additional hour of work is greater than the disutility of the previous hour. A large value of β implies a lack of responsiveness of hours to work to net wage incentives (i.e., a low wage elasticity of hours of work). Under these conditions, a large net wage is required to induce an individual to work large numbers of hours.

We expect δ to be positive as well, which, given the negative sign that preceeds this parameter in the utility function, means that each additional dollar of income (earned or unearned) provides less utility than the preceeding dollar. If δ is large, then an individual may consider himself or herself to be only slightly better off with a large income than with a small income. Under these circumstances, there is little incentive to

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[2]Leisure time is the difference between total time available and total hours of work: L = (T - H). In the context of this study, a concave utility function implies that both leisure and income have positive but diminishing marginal utilities.

work additional hours to earn more income and, furthermore, the availability of any nonlabor income (e.g., food stamp benefits) is a strong work disincentive.

The parameter α represents the unattractiveness of the first hour of work in a period. Our expectation is that α is negative. In combination, α and β can be used to determine the unattractiveness of an additional hour of work from any base level of work effort. We let α be a function of a vector of observed socioeconomic characteristics, X, and an unobserved disturbance term, ε:

$$\alpha = X\psi + \varepsilon \tag{4}$$

The coefficients in the ψ vector represent the magnitudes of differences in work effort associated with the variables in X.

As in the FM model, a problem arises in estimating the labor supply model given by equations (1) - (4) because the potential wage rates of nonworkers are unknown. This means that their potential earnings (and, hence, net household income) at part-time and full-time work cannot be calculated. We therefore specify and estimate an equation for the hourly wage rate, W. The estimated wage can then be used to determine what the expected earnings of nonworkers would be if they were working part-time or full-time.

We specify a wage equation with a semi-logarithmic functional form:

$$\ln(W) = S\lambda + \zeta D + \nu \tag{5}$$

where S is a vector of socioeconomic characteristics and measures of geographic location, λ is the associated vector of parameters, D is a dummy variable equal to one if the individual works full-time and zero if he or she works part-time, ζ is the coefficient associated with D, and ν is a random disturbance term. Thus we allow wages to differ

Table of Contents

for part-time and full-time work. Equation (5) can be estimated on the subsample of workers with an adjustment for selection bias, and the resultant parameter estimates can be used to impute wages to nonworkers.[3]

In summary, the parameters of the model to be estimated are as follows: (1) the key parameters β and δ, which represent the labor supply responses to the rate of change in net income as hours of work change and to the total amount of net income; (2) the ψ coefficients, representing the effects of socioeconomic and grographic control variables on work effort; and (3) λ and ζ, the effects of the wage-determining variables. We use full-information maximum likelihood, the statistically preferable procedure, to simultaneously estimate these parameters. We also estimate the variance of ν (designated σ^2_ν) and the correlation between ν and ε (designated ρ), where ν is the disturbance term in the wage equation and ε is the disturbance term in equation (4). The variance of ε is normalized to one. (Note: Substitution of (4) into (2) and then into (3) reveals that ε is indirectly the disturbance term in the hours-of-work equation.)

2. Extensions of the Model

With the assumption of a fixed wage rate, W, and a fixed amount of income not attributable to the subject's own labor, N, we can derive from equations (1) - (3) the labor supply function and expressions for the wage and income elasticities of hours of work:

$$H = \frac{\alpha + W(1-2\delta N),}{2(\beta + \delta W^2)} \tag{6}$$

[3]Rather than first estimating equation (5) separately and then using the results in the subsequent estimation of equations (1) - (4), we use maximum likelihood to estimate all five equations simultaneously. This properly treats the variable D, which is endogenous. Furthermore, by allowing for the possible correlation of the disturbance terms in equations (4) and (5), it is a more efficient procedure than first estimating equation (5) separately.

Table of Contents

$$\text{Wage elasticity} = \frac{W[1 - 2\delta(2WH + N)]}{2H(\beta + \delta W^2)}, \qquad (7)$$

$$\text{Income elasticity} = \frac{-\delta W^2}{\beta + \delta W^2} \qquad (8)$$

C. DATA AND EMPIRICAL SPECIFICATION ISSUES

The source of data for this study is the 1984 Panel of the Survey of Income and Program Participation, a nationally representative longitudinal survey of the U.S. population. The 19,878 households in the 1984 Panel were first interviewed in the fall of 1983 and were subsequently interviewed eight times at four-month intervals over a 2-1/2 year period. At every interview, the survey gathered "core" information on subjects such as household demographics, sources and amounts of income, labor force participation, and participation in assistance programs. Information on events that occurred in the past, such as work and welfare histories, and on characteristics that tend to change slowly over time, such as health status and asset holdings, was gathered in "topical modules" that were administered once or twice over the life of the panel.[4]

Because it provides topical data on asset holdings and shelter expenses, both of which are necessary in order to model eligibility for food stamps, Wave 4 of the 1984 SIPP Panel is the principal source of data for this study. We augmented the Wave-4 data with data from the Wave-3 work history topical module, which permits us to model eligibility for unemployment compensation benefits. From the augmented Wave-4 file, we extracted data for men and women ages 18 through 59 who were unmarried and had no children under the age of 18. We excluded from the extract file adults who were self-employed or in the armed forces, who resided in households in which there were disabled

[4]See David (1985) for an overview of SIPP, or the Bureau of the Census (1987) for a more detailed description of SIPP.

persons or persons over the age of 59, or who lived in any of six states for which SIPP does not provide unique identifiers.[5]

The model presented in the previous section recognizes that individuals may adjust their hours of work so as to qualify for food stamps; likewise, they may spend down their assets to quality. For example, if food stamp benefits had been more generous at the time the Wave-4 data were collected, some of the income ineligible individuals might have opted to work less in order to qualify for food stamps. Thus, program eligibility is an endogenous variable in this analysis. As a general rule, the selection of a sample on the basis of endogenous variables results in biased estimates. For this reason, we chose not to select into our sample only those cases that were observed to be income and asset eligible for food stamps.

Some of the Wave-4 respondents were so highly skilled and attached to the labor force or had such large asset balances that is unlikely that any plausible change in the Food Stamp Program could have induced them to alter their behavior so as to become eligible for benefits. Their inclusion in the analysis might bias our estimates of the labor supply parameters for the group of interest. We therefore excluded those cases from our analysis, using selection criteria which minimized the potential bias from selecting the sample on the basis of endogenous variables. We used a screen on current hourly wages in excess of $10 to exclude highly skilled individuals with strong labor force attachments. We also excluded cases with asset holdings in excess of three times the food stamp asset eligibility limit.[6] For those individuals, program eligibility was not an

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[5]Unique state identifiers are required for the modeling of potential unemployment compensation benefits. The six states without unique SIPP identifiers are Idaho, new Mexico, South Dakota, Wyoming, Mississippi, and West Virginia. All states are included in the SIPP sampling frame; however, no households in Alaska were included in the 1984 SIPP sample.

[6]The food stamp asset eligibility limit for households with no elderly members was $1,500 at the time the Wave-4 SIPP data were collected in the fall of 1984. Our measure of assets included financial assets as well as food-stamp-countable vehicular assets.

Table of Contents

endogenous variable in a practical sense; therefore, the screens introduced minimal bias into our estimates. With these screens, we extracted data for 1,393 men and women.

Our effort to estimate a food stamp participation equation jointly with the wage rate and hours of work equations was unsuccessful because of the small number of food stamp participants in our extract file.[7] As an alternative estimation strategy, we dropped from our analysis file the 74 food stamp participants, as well as 4 AFDC/GA participants, and then estimated (separately for men and women) a joint model of wages and hours.

The negative consequences of the dropping of the food stamp participants from the analysis sample and the omission of the food stamp participation equation from the model are: (1) reduction in the efficiency of the estimation procedure and (2) elimination of the possibility of controlling for selection bias associated with the food stamp participation/nonparticipation decision in the estimation of the wage and hours equations.[8] In light of this, we considered including the food stamp participants in our estimation of the two-equation model of wages and hours, while continuing to omit the food stamp participation equation. However, without a food stamp participation equation, those estimates would be subject to selection bias. Specifically, we were concerned that the inclusion of those cases would bias our estimates of the responsiveness of hours of work to changes in the net wage rate and net income (i.e., the β and δ parameters). In our judgment, the integrity of the analysis was threatened more

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[7]The maximum likelihood procedure with which we attempted to estimate jointly the three equations does not perform well when the sample size is small. The sample size problem was exacerbated by the need to estimate the model separately for men and women.

[8]Selection bias is a potential problem in the analysis of the sample of food stamp nonparticipants because some among those cases could have participated if they had wished to do so, but they opted not to do so.

by this potential bias than by the loss of efficiency resulting from the exclusion of the participants.

The exclusion of food stamp and AFDC/GA participants left 1,315 cases in our analysis file. The software that we used to generate maximum likelihood estimates of the model of wages and hours was unable to process data on 23 of those cases,[9] which we therefore dropped from the analysis, leaving a final sample of 1,292 cases--632 men and 660 women.

To implement the model described in the previous section, we computed the income (including transfer payments), net of taxes, which individuals in our analysis sample would receive at each of the three hours of work points (0 hours, 20 hours, and 40 hours per month) in the model. In addition to information on wages and nonlabor income, this required information on potential unemployment compensation benefits, individual income taxes, and Social Security payroll taxes.

We assumed that the individuals in our sample who were employed either in 1983 or in the months in 1984 that preceed the Wave-4 reference period were eligible to receive the state mean unemployment compensation benefit for single individuals if they were not currently working (i.e., if they were at the 0 hours point).[10] We further assumed that no unemployment compensation benefit was available to such persons at the two positive hours points.

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[9]For the 23 problematic cases, the estimation software generated negative probabilities of the selection of one or more of the three hours of work points: zero hours, part time, and full time. Such negative probabilities are inconsistent with the logic of the underlying economic model and constitute a fatal error in the estimation procedure, causing it to terminate unsuccessfully.

[10]Wave-4 interviews were staggered over the months September to December of 1984. The reference period for an interview was the four months prior to the month of the interview.

Table of Contents

We computed federal individual income taxes on the assumption that our sample members filed as single individuals and took the standard deduction. We used tax rates and brackets that were applicable to income earned in 1984 to compute tax obligations at 0, 20, and 40 hours of work per week. Similarly, we used the then applicable payroll tax rate and maximum taxable earnings to compute Social Security tax obligations at the three hours points. Due to their great complexity, we did not attempt to model state income taxes.

Recall that our model jointly explains the wage rate and the choice among zero, part-time, and full-time employment. For our selected analysis sample of 1,292 cases, Tables 1 and 2 provide descriptive statistics on the dependent wage rate and employment status variables in the model. In addition, Table 1 provides descriptive statistics on the control variables in both the wage equation and the labor supply equation.

D. ESTIMATION RESULTS

The inclusion of insignificant variables in the wage and hours equations often rendered our model incapable of generating estimates of the parameters in those equations. Poor performance in the presence of insignificant explanatory variables is characteristic of complex maximum likelihood models such as ours. This necessitated that we estimate many different specifications of the model, gradually building up the equations by adding one or two control variables at a time and deleting insignificant variables that appeared to have caused the estimation procedure to fail on the previous run. All specifications included the parameters β and δ, which determine the signs and magnitudes of the wage and income elasticities of labor supply. The estimates of these parameters were highly stable over the alternate specifications of the control variables in the wage rate and labor supply equations.

Table 3 shows the estimates of the parameters in our final models for men and women. The estimates of β and δ are positive and highly significant for both men and

Table of Contents

TABLE 1

MEANS AND STANDARD DEVIATIONS OF VARIABLES IN THE ANALYSIS FILE:
UNMARRIED ADULTS WITHOUT DEPENDENT CHILDREN

Variable	Men (N=632)		Women (N=660)	
	Mean	Std. Dev.	Mean	Std. Dev.
Hourly wage rate for workers (N=531 males, 554 females)	5.90	2.20	5.57	1.96
Age	29.49	9.22	33.29	12.63
Age squared	954.39	664.53	1,267.76	958.96
Years of schooling	12.77	2.54	12.84	2.36
Race (1=nonwhite, 0=white)	0.19	0.39	0.17	0.37
Ethnicity (1=Hispanic, 0=non-Hispanic)	0.05	0.21	0.04	0.19
Two persons in household (1=yes, 0=no)	0.25	0.44	0.30	0.46
Three or more persons in household (1=yes, 0=no)	0.14	0.35	0.12	0.32
Other earners in household (1=yes, 0=no)	0.31	0.46	0.32	0.47
South census region (1=yes, 0=no)	0.31	0.46	0.31	0.46
Resides in SMSA (1=yes, 0=no)	0.54	0.50	0.56	0.50
State unemployment rate (%), September 1984	6.95	1.56	7.01	1.57

SOURCE: Computed by Mathematica Policy Research from Wave-4 of the 1984 SIPP Panel.

Table of Contents

TABLE 2

EMPLOYMENT STATUS OF CASES IN THE ANALYSIS FILE:
UNMARRIED ADULTS WITHOUT DEPENDENT CHILDREN

Employment Status	Percent	Hours Worked per Week	
		Mean	Std. Dev.
Men (N=632):			
Zero hours of work	16.0	0.0	0.0
Part-time work (1-34 hours)	13.4	25.4	6.9
Full-time work (35 or more hours)	70.6	45.9	10.1
Women (N=660):			
Zero hours of work	16.1	0.0	0.0
Part-time work (1-34 hours)	14.5	24.7	8.6
Full-time work (35 or more hours)	69.4	43.6	7.5

SOURCE: Computed by Mathematica Policy Research from Wave-4 of the 1984 SIPP Panel.

Table of Contents

TABLE 3

RESULTS OF ESTIMATING THE JOINT WAGE RATE AND LABOR SUPPLY MODEL:
UNMARRIED ADULTS WITHOUT DEPENDENT CHILDREN

	Men (N=632)	Women (N=660)
Log wage		
Constant	0.3302 (0.2534)	-0.0507 (0.2180)
Age	0.0745** (0.0161)	0.0638** (0.0119)
Age Squared	-0.0009** (0.0002)	-0.0008** (0.0002)
Years of schooling	0.0037 (0.0085)	0.0353** (0.0079)
Hispanic		-0.1461 (0.0998)
Nonwhite	-0.1183* (0.0564)	
South	-0.0464 (0.0442)	-0.0285 (0.0388)
SMSA	0.0612 (0.0405)	0.1377** (0.0374)
ζ	-0.0956* (0.0402)	-0.0712* (0.0290)
σ_ν	0.4679 (0.0326)	0.4205 (0.0228)
Labor supply		
Constant	-0.4980 (0.3229)	-0.2091 (0.2959)
Hispanic	0.7271 (0.3870)	0.3232 (0.2229)
Nonwhite	-0.5470** (0.1342)	-0.3015** (0.1421)

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Table of Contents

TABLE 3 (continued)

	Men (N=643)	Women (N=672)
Labor Supply (Continued)		
Two persons in household	0.2997 (0.2121)	-0.0648 (0.1906)
Three or more persons in household	0.4287 (0.2376)	-0.3780 (0.2054)
Other earners in household	0.5207* (0.2260)	0.6795** (0.2009)
State unemployment rate	-0.0558 (0.0375)	-0.0695 (0.0357)
β^a	0.5482** (0.0151)	0.6519** (0.0118)
δ^a	0.0127** (0.0002)	0.0098** (0.0002)
ρ^b	-0.0412 (0.1432)	0.0298 (0.1183)
Log LF	-826.07	-806.92

SOURCE: Computed by Mathematica Policy Research from Wave 4 of the 1984 SIPP Panel.

NOTE: Asymptotic standard errors are in parentheses.

[a]Parameter estimate and standard error multiplied by 100.

[b]ρ is the correlation between the disturbance term ν in the wage equation and the disturbance term ε in the labor supply equation.

* (**): Significant at the .05 (.01) level.

Table of Contents

women. We attribute the similarity in these coefficients for men and women to the restriction of the analysis files to single men and women without dependent children. Studies of married men and women have found large male-female differences in these coefficients.

We can use the estimates of β and δ, along with the mean net wage rate and the mean income available to a subject's household, to evaluate the equations given in Section B for the wage and income elasticities of hours of work. At zero hours of work, the wage elasticity for men is .99 and their income elasticity is -.27. For women, the corresponding elasticities are 1.14 and -.17. For both men and women these elasticities are bigger than the corresponding elasticities that we previously estimated for female heads of household.[11]

The differences between these elasticities and those which we previously obtained may be a result of the different family situations of single men and women without dependents, on the one hand, and female heads of household, on the other. Female heads have children who require care and therefore may face significant costs of working (e.g., child care expenses). Consequently, they may be less responsive to changes in the monetary attractiveness of working. If, for example, a female head is supporting her household by working, she might have little flexibility in her time schedule to increase her hours in response to a net wage increase and little flexibility in her budget to reduce her hours in response to a net wage reduction. Alternatively, if a female head is not working, and is receiving AFDC and food stamps, she may be relatively insensitive to small changes in the monetary attractiveness of working. In contrast, single men and women without dependents are likely to have more freedom to move in and out of the labor force and to change their hours of work as the monetary rewards change.

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[11]Our estimates of the wage elasticity of the labor supply of female heads range from .26 to .35. Our estimates of the income elasticity range from -.07 to -.11 (Fraker and Moffitt, 1988).

Table of Contents

Compared with elasticity estimates from other sources for married men and women, the elasticities that we have obtained for single men and women are, with one exception, high.[12] Wage elasticities for married men are generally in the range .08 to .20 and their income elasticities are quite small. Wage elasticites for married women are often in the .80 to 1.00 range and their income elasticities are around -.30. The range of wage elasticities for married women exceeds our previous estimates for female heads of household, but is below our current estimate for single women without dependents. Once again, given the lack of family responsibilities, it is not surprising that previous findings for female heads of household. One possible explanation for this finding is that higher wages may compensate part-time workers for fewer fringe benefits.

For both men and women, we obtain significant negative estimates of the effect on labor supply of being nonwhite and significant positive estimates of the labor supply effect of the presence in the household of another person with earnings. Our estimates of ρ show provide no significant evidence of correlation between the disturbance terms in the wage and hours equations for either men or women.

E. RESULTS OF SIMULATION EXERCISES

The Food Stamp Program provides households that have no net income (as defined by the program) a benefit, referred to as the "guarantee amount," which is determined by the size of the household. As with most transfer programs, the FSP imposes an implicit tax on earnings so that the size of the benefit is reduced as earnings and, hence, net income increase. Both the guarantee amount and the implicit tax on earnings may provide disincentives for food stamp recipients to work. Under the assumption that the disincentives associated with food coupons are identical to those that would be associated with a similarly structured cash assistance program, we can use the parameter estimates reported in Section D to simulate the labor supply responses to the FSP as a whole and to changes in several of its parameters.

In this section we first describe how the Food Stamp Program alters the tradeoff between income (including food stamps) and leisure which a low-income household faces. We then combine this information with our estimates of the critical labor supply parameters β and δ to simulate the labor supply responses to the FSP of low-wage single men and women without dependent children.

Table of Contents

1. Modeling the Income-Leisure Tradeoff Under Food Stamps

The FSP has special provisions that govern the benefit amounts that are available to households with elderly or disabled persons and to households with dependent care expenses. We have defined our analysis samples in such a way that these provisions are not applicable. This permits important simplifications in our modeling of the food stamp benefit formula and, ultimately, in our modeling of the income-leisure tradeoff with and without food stamps. For the cases in our sample, the benefit formula is roughly the following:

$$
\begin{aligned}
B &= \max[M, G - BRR{*}Y_n], && \text{if } Y_n \le Y^* \text{ and } WH + N \le 1.3Y^*, \\
&= 0, && \text{if } Y_n > Y^* \text{ or } WH + N > 1.3Y^*,
\end{aligned}
\tag{9}
$$

$$Y_n = \max[0, WH + N - (EID{*}WH + D + S)], \tag{10}$$

$$S = \min[SMAX, \max(0, R - 0.5Y_m)], \tag{11}$$

$$Y_m = \max[0, WH + N - (EID{*}WH + D)], \tag{12}$$

where B is the food stamp benefit, M is the minimum benefit, G is the guarantee amount, BRR is the benefit reduction rate, Y_n is food stamp net income, Y^* is the poverty income threshold, W is the hourly wage rate, H is hours of work per month, N is other household income, EID is the proportion of earned income that is deducted in computing food stamp net income, D is the food stamp standard deduction, S is the excess shelter expense deduction, SMAX is the maximum allowable shelter deduction, R is the household's rent or other shelter expense, and Y_m is an intermediate measure of net income.[14]

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[14] G, Y^*, D, and SMAX are indexed amounts that are normally adjusted for inflation on an annual basis. BRR and EID are unindexed program parameters with the current (1988) values of 0.3 and 0.2, respectively. The minimum benefit is unindexed. Its current value is $10 for 1 and 2 person households and $0 for larger households.

For an individual in our sample of men or our sample of women, we can use this formula to determine the food stamp benefit for which his or her household would qualify at different levels of work effort by the individual. If, for each possible level of work effort by the individual, we add the computed food stamp benefit to the household's expected earnings and nonlabor income, we obtain the household's budget constraint. The household's budget constraint in the absence of the Food Stamp Program is illustrated in Figure 1 as AB. The slope of AB is given by the wage rate (i.e., for each hour of work net income increases by an amount equal to the hourly wage). In the presence of the FSP, the budget constraint is CDEFGHIB. These constraints assume that there are no income or payroll taxes and that the potential wage rate is invariant with respect to hours of work. These assumptions facilitate the graphical representation of the effect of the FSP on the household budget constraint; they are not incorporated into our empirical analysis.

In the presence of food stamps, the initial segment of the budget constraint is CD. In this segment the standard deduction and the shelter deduction are sufficiently large that the household's food stamp net income is zero and the program tax rate on earnings is zero. In segment DE, net income is positive and the shelter deduction is assumed to be at its maximum amount. The tax rate on earnings is .24 (the 30 percent benefit reduction rate times 80 percent of earnings). In segment EF, the shelter deduction is being reduced by $.50 for every $1 in earnings. This causes the tax rate to increase to .36. At point F, the shelter deduction has fallen to zero and the tax rate on earnings reverts to .24. At point G, net income is sufficiently high that the household qualifies for only the $10 minimum food stamp benefit. The invariance of the minimum benefit with respect to income means that the program tax rate on earnings is zero over segment GH. At point H, the household becomes income-ineligible for food stamps and the minimum benefit is lost. Segment IB coincides with the budget constraint in the absence of food stamps.

Income taxes and social security payroll taxes introduce additional kinks and segments in the budget constraint without food stamps as well as in the budget constraint with food stamps. An additional source of complexity is a wage rate that varies with hours of work. This may introduce either additional kinks and segments or continuous curvature into the budget constraints. Clearly, a realistic budget constraint with or without food stamps is likely to be highly complex. We do not attempt to illustrate this complexity in Figure 1, but we do incorporate it into our estimation of the model of hours and wages, as reported in Section D, and in our simulation of labor supply responses to food stamps. We accomplish this by analyzing labor supply as trichotomous choice between not working, part-time work, and full time work. In this analytic framework we need only model the budget constraint at 0, 20 and 40 hours of work per week.

2. Simulation Strategy

Changes in regulations governing the determination of food stamp eligibility and benefit amounts may shift the budget constraint and thereby alter the incentives for low-wage individuals to work. In this section, we use the representation of the food stamp eligibility and benefit regulations in equations (9) - (12), as well as our econometric estimates of the responsiveness of work effort to changes in net wages and net income, to simulate labor supply responses to three hypothetical changes in the FSP:

1. An increase in the benefit reduction rate (BRR) from the current .30 to .33.

2. The replacement of the uncapped 20 percent earned income deduction (EID) with a 100 percent deduction up to a maximum of $75 per month.

3. The elimination of the current $10 minimum benefit for one- and two-person households.

FIGURE 1

REPRESENTATIVE BUDGET CONSTRAINTS WITH AND WITHOUT FOOD STAMPS

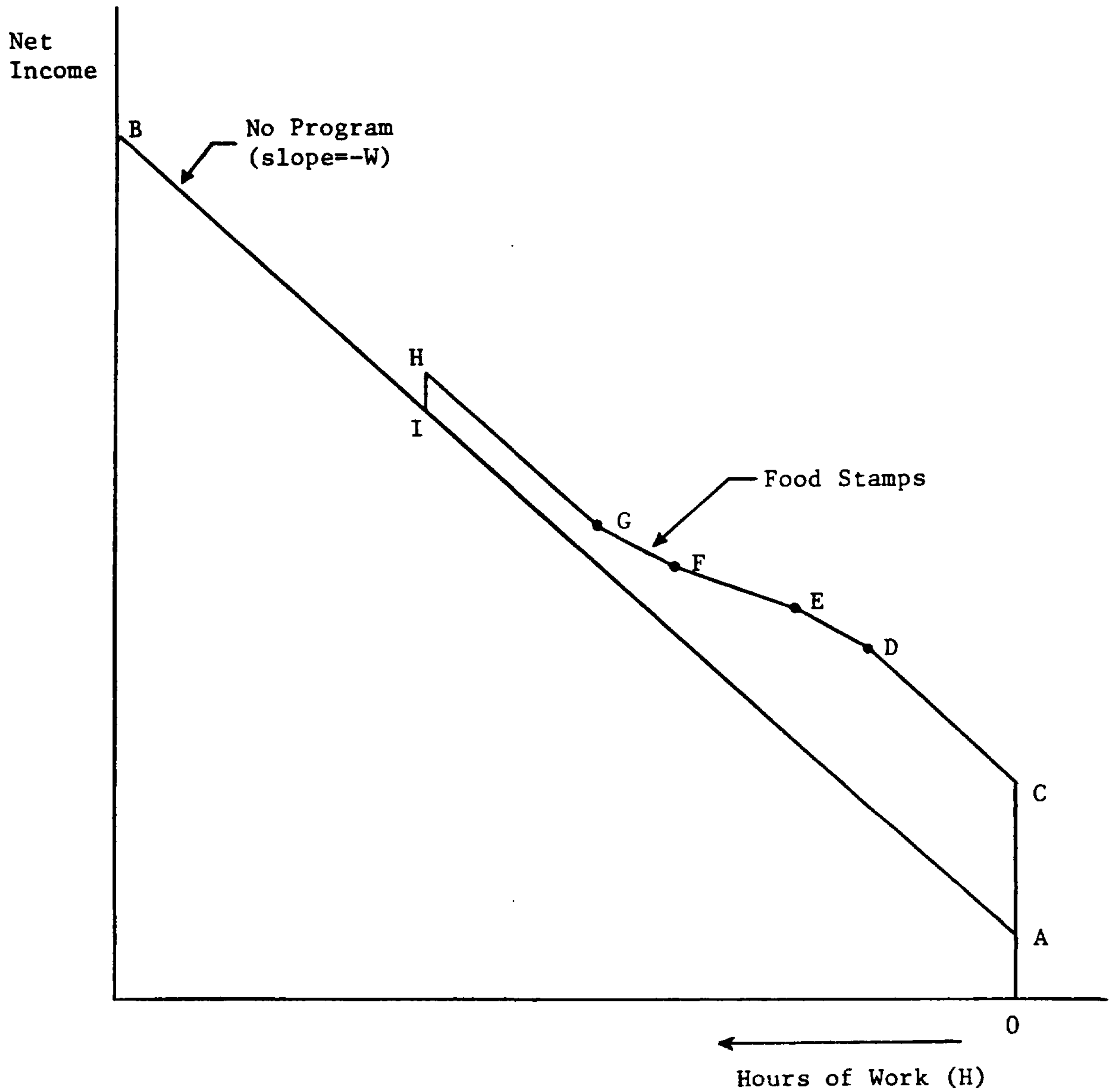

Table of Contents

The first step in the simulation process is to simulate the work effort under the existing FSP of each individual in our analysis files for single men and women. This entails computing the probabilities that an individual works full-time, part-time, or not at all, given the existence of the FSP. We assume that an individual who would be eligible for food stamps at one or more of those levels of work effort would in fact choose to receive them.[15] An individual's probability of participating in the FSP is given by the sum of the probabilities of selecting levels of work effort at which he or she qualifies for a positive food stamp benefit. The expected hours of work by an individual are given by the probabilities of selecting the three different levels of work effort:

$$\text{Expected Hours}_i = \text{Prob}_i(\text{No Work})*0 + \text{Prob}_i(\text{Part-time})*20 + \text{Prob}_i(\text{Full-time})*40 \tag{13}$$

where "i" designates the i-th sample member, part-time work is assumed to entail 20 hours of labor per week, and full-time work is assumed to entail 40 hours of labor per week. The sample mean simulated hours of work is the average expected work hours over all individuals in the sample.

The second step in the simulation process is to adjust one of the program parameters as described above and then to resimulate the work effort of the sample individuals. We then make pre-post comparisons of the distribution of individuals across the three levels of work effort and the average hours of work for the entire sample and for the subsample of food stamp participants. Finally, we simulate work effort under the assumption that all three of the hypothetical program changes have been implemented, and make pre-post comparisons of the results.

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[15] We acknowledge the lack of realism in the assumption of a 100 percent rate of participation in the FSP by eligible persons. This assumption is a necessary consequency of our inability to estimate a food stamp participation equation.

Table of Contents

3. Simulation Results

Two factors should be considered in interpreting the simulation results:

1. A program change may encourage some persons to leave the program and increase their work effort, while simultaneously discouraging work effort by those who remain on the program. Conclusions regarding whether such a change increases or decreases work effort may vary according to how one defines the group of interest.

2. A program change may affect program eligibility without having much effect on work effort; however, if the original work effort of those whose eligibility is affected differs from that of the average program participant, then the average work effort of program participants (as measured before and after the change) may be strongly affected by the program change.

These factors lead us to conclude that our simulation results for the full analysis samples of men and women provide the most accurate information on the labor supply effects of program changes. The results for program participants provide accurate "snapshot" estimates of the work effort of unmarried food stamp participants without dependent children before and after a program change; however, they tell us little about changes in the work effort of those who enter or leave the program as a consequence of the program change or about changes in the work effort of those who remain on the program despite the change in regulations.

Tables 4 and 5, respectively, present the simulation results for single men and women. There are no major differences between the sexes in the results. Our comments here are based upon the findings for men, but they apply almost equally well to women.

Rows A1 and B1, respectively, in Table 4 show the distributions of simulated work effort under the current FSP for all of the cases in our analysis sample of single men and for the simulated FSP participants in that sample. The average simulated work hours per week for the full sample of men is 30.62 and two-thirds of the men are simulated to work full time. The situation is quite different for the men in the sample who are simulated to receive food stamps. Two-thirds of those men do not work and the average work hours per week for participants is just 8.18.

Table of Contents

TABLE 4

SIMULATED LABOR SUPPLY RESPONSES OF UMARRIED MEN WITHOUT DEPENDENT CHILDREN TO HYPOTHETICAL CHANGES IN THE FOOD STAMP PROGRAM

Food Stamp Program	Percent Dist. of Cases by Employment Status: Non-Worker	Part-Time	Full-Time	Avg. Hrs. Per Week	Number of Simulated FSP Participants[1]
All Sample Cases (N=632):					
A1. Current FSP	15.2	16.5	68.3	30.62	197.1
A2. Current FSP, but: BRR = .33	15.4	16.1	68.6	30.64	197.0
A3. Current FSP, but: EID rate = 100% Max. EID = $75	15.2	16.5	68.3	30.61	195.2
A4. Current FSP, but: Min. benefit = $0	15.3	16.3	68.4	30.63	180.9
A5. Current FSP, but: BRR = .33 EID rate = 100% Max. EID = $75 Min. benefit = $0	15.5	15.7	68.7	30.64	161.6
A6. No FSP	11.3	15.7	73.0	32.32	0.0
Simulated FSP Participants:[1]					
B1. Current FSP	68.8	21.6	9.7	8.18	197.1
B2. Current FSP, but: BRR = .33	69.7	20.6	9.6	7.98	197.0
B3. Current FSP, but: EID rate = 100% Max. EID = $75	70.0	20.7	9.3	7.87	195.4
B4. Current FSP, but: Min. benefit = $0	71.7	19.3	9.1	7.48	180.9
B5. Current FSP, but: BRR = .33 EID rate = 100% Max. EID = $75 Min. benefit = $0	75.8	16.8	7.4	6.33	161.2

SOURCE: Computed by Mathematica Policy Research from Wave-4 of the 1984 SIPP Panel.

[1]This table presents simulated hours of work and FSP participation for the 632 male cases that were the basis for the estimation of the model of wages and hours of work. No actual food stamp participants are included among those cases.

Table of Contents

TABLE 5

SIMULATED LABOR SUPPLY RESPONSES OF UNMARRIED WOMEN WITHOUT DEPENDENT CHILDREN TO HYPOTHETICAL CHANGES IN THE FOOD STAMP PROGRAM

Food Stamp Program	Percent Dist. of Cases by Employment Status: Non-Worker	Part-Time	Full-Time	Avg. Hrs. Per Week	Number of Simulated FSP Participants[1]
All Sample Cases (N=660):					
A1. Current FSP	16.0	17.5	66.6	30.13	195.4
A2. Current FSP, but: BRR = .33	16.2	16.7	67.1	30.16	194.7
A3. Current FSP, but: EID rate = 100% Max. EID = $75	16.1	17.1	66.7	30.12	192.9
A4. Current FSP, but: Min. benefit = $0	16.0	17.3	66.7	30.13	183.0
A5. Current FSP, but: BRR = .33 EID rate = 100% Max. EID = $75 Min. benefit = $0	16.5	16.1	67.4	30.17	164.0
A6. No FSP	11.5	16.2	72.3	32.17	0.0
Simulated FSP Participants:					
B1. Current FSP	66.3	26.0	7.7	8.29	195.4
B2. Current FSP, but: BRR = .33	67.8	24.4	7.8	8.01	194.7
B3. Current FSP, but: EID rate = 100% Max. EID = $75	67.5	25.1	7.5	8.00	192.9
B4. Current FSP, but: Min. benefit = $0	69.1	23.8	7.1	7.59	183.0
B5. Current FSP, but: BRR = .33 EID rate = 100% Max. EID = $75 Min. benefit = $0	73.6	20.3	6.1	6.49	164.0

SOURCE: Computed by Mathematica Policy Research from Wave-4 of the 1984 SIPP Panel.

[1]This table presents simulated hours of work and FSP participation for the 660 female cases that were the basis for the estimation of the model of wages and hours of work. No actual food stamp participants are included among those cases.

An Increase in the Benefit Reduction Rate. An increase in the food stamp benefit reduction rate from .30 to .33 causes some working FSP participants to lose their food stamp eligibility and causes others to reduce their work hours. These changes are reflected in Row B2 of Table 4, which shows a slight increase in nonemployment by FSP participants and slight reductions in average work hours and in program participation in response to the increase in the BRR. Row A2 provides valuable additional information on the labor supply response to this program change. For the full sample of single men, Row A2 shows that the proportion of full-time workers and the average weekly hours of work both increase slightly in response to the increase in the BRR. This apparently is attributable to the simultaneous exit from food stamps and increase in work effort by a small proportion of men who formerly received food stamps and worked part-time.

In summary, a small increase in the BRR is simulated to result in a slight reduction in the number of single male food stamp recipients. Those who remain on the program work slightly fewer hours on average than those who were on the program prior to the change. Among all low-wage single men without dependents, the increase in the BRR actually stimulates a very small increase in the average hours of work per week. The increase is attributable to men who stop receiving food stamps as a consequence of the program change.

An Increase in the Earned Income Deduction Rate and a Cap on that Deduction. Row B3 of Table 4 shows that the replacement of the current uncapped 20 percent earned income deduction with a 100 percent deduction of earnings up to a maximum of $75 is simulated to result in a slightly smaller number of unmarried men who are food stamp recipients and in a small reduction in average work hours among those who participate after the change as compared with those who participate under the current program. These changes are in the same direction and slightly greater than the changes associated with an increase in the BRR to .33.

Table of Contents

Row A3 of Table 4 indicates that, for low-wage single men as a whole, the capping of the EID at $75 results in a very slight reduction in work effort. It appears that the increase in work effort by the small proportion of men who exit food stamps as a consequence of the cap is not substantial enough to offset the reduction in work effort by men who remain on the program.

Elimination of the Minimum Benefit. The current FSP provides a minimum benefit of $10 to one- and two-person households which satisfy the program's income and asset eligibility requirements. Were it not for this floor on the benefit amount, many households that now receive the minimum benefit would not qualify for a positive benefit. Our simulations of work effort in the absence of the $10 minimum benefit assign a status of "nonparticipation" to households that are eligible to receive food stamps but do not qualify for a positive benefit.

Row B4 of Table 4 shows that the distribution of simulated work effort by single male food stamp participants shifts to the left (i.e., toward no work) with the elimination of the $10 minimum benefit. The mean of the distribution falls by .7 hours per week, a 9 percent reduction. While small in an absolute sense, this change in the average simulated work effort of food stamp participants is larger than the average simulated response to either of the other two program changes.

The 8 percent drop in the simulated number of food stamp participants in response to the elimination of the minimum benefit suggests that much of the pre-post shift in the distribution of labor hours may be due to the loss of eligibility for a positive benefit by men who previously worked more than the average unmarried male recipient without dependents. Without any reduction in work effort by continuing recipients, this could explain the leftward shift in the distribution of hours of work. This hypothesis is further supported by the stability of the distribution of simulated hours of work for the full sample of single men in response to the program change. Thus, it appears that the

Table of Contents

elimination of the minimum benefit causes some men who work relatively large hours to exit the FSP but has little impact on actual work effort.

Multiple Program Changes. Row B5 of Table 4 shows that the average simulated work effort of unmarried male food stamp recipients subsequent to the simultaneous implementation of all three of the above program changes is 23 percent less (6.33 hours per week versus 8.18 hours) than the average simulated work effort prior to the changes. For the full sample of low-wage single men without dependent children, a comparison of Rows A5 and A1 reveals remarkably little pre-post difference in the distribution of work hours. We believe that shifts of workers from participation to nonparticipation status with little change in work effort, as well as reductions in work by continuing participants that are offset by increases in work by men who exit the program, account for these two sets of findings.

Elimination of the FSP. To obtain an estimate of the total impact of the FSP on the labor supply of low-wage unmarried men without dependent children, we simulated their work effort in the absence of the FSP. A comparison of the results of that simulation in Row A6 of Table 4 with the Row A1 results for the current FSP reveals an increase in work effort of 1.7 hours per week (5.6 percent) among all low-wage single men without dependents with the elimination of the FSP. All of this increase is simulated to occur among participants under the current program. Their work effort increases by 5.45 hours per week, on average.

4. Comparison of Simulation Results with Previous Findings

We reported above (see Section D) that our estimates of the wage and income elasticities of labor supply for both single men and single women are larger than our earlier estimates for female heads of household. This finding, combined with the fact that unmarried persons without dependents are more likely to be subject to the food stamp minimum benefit, suggests that single adults may be more responsive to the

Table of Contents

selected hypothetical program changes than are female heads of households. Our simulation results support this expectation.

Table 6 summarizes our earlier findings regarding the effect of the three hypothetical program changes on the work effort of female heads, as well as our current findings for unmarried women without dependent children. For each selected program hange and for the simultaneous implementation of all three changes, the table shows that the reduction in average work effort relative to the average work effort under the baseline program is greater among the unmarried women without dependents than among the female heads. We believe that this is due to the larger labor supply elasticities of the women without dependents and to the larger proportions of women without dependents who work under the baseline FSP and are at risk of loosing eligibility for positive benefits under the hypothetical changes in the baseline FSP.

Table of Contents

TABLE 6

THE SIMULATED WORK EFFORT OF FOOD STAMP PARTICIPANTS:
A COMPARISON OF CURRENT FINDINGS FOR UNMARRIED WOMEN WITHOUT
DEPENDENTS WITH PREVIOUS FINDINGS FOR FEMALE HEADS OF HOUSEHOLD

	Female Heads		Women w/o Dependents	
Food Stamp Program	Avg. Hours Per Week	Percent of Baseline	Avg. Hours Per Week	Percent of Baseline
1. Baseline FSP[1]	9.60	100.0%	8.29	100.0%
2. Baseline FSP, but: BRR = .33	9.54	99.4%	8.01	96.6%
3. Baseline FSP, but: EID rate = 100% Max. EID = $75	9.38	97.7%	8.00	96.5%
4. Baseline FSP, but: Min. benefit = $0	9.60	100.0%	7.59	91.6%
5. Baseline FSP, but: BRR = .33 EID rate = 100% Max. EID = $75 Min. benefit = $0	9.33	97.2%	6.49	78.3%

SOURCES: Results for female heads are from Fraker and Moffitt (1985); results for women without dependent children were computed by Mathematica Policy Research from Wave 4 of the 1984 SIPP Panel.

[1]For female heads the baseline FSP has an 18 percent earned income deduction. For women without dependents the baseline FSP has a 20 percent earned income deduction.

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